

## 【DESCRIPTION】

### 【TITLE OF THE INVENTION】

Slide Type Portable Terminal

### 【BRIEF DESCRIPTION OF THE DRAWINGS】

FIG. 1 is a perspective view showing the configuration of a related art slide type portable terminal;

FIG. 2 is an exploded perspective view showing the structure of main portions of the related art slide type portable terminal;

FIG. 3 is a perspective view showing the configuration of a preferred embodiment of a slide type portable terminal according to the present invention;

FIG. 4 is an exploded perspective view showing the structure of first and second plates according to the preferred embodiment of the present invention; and

FIG. 5 is a rear view showing a state where the first and second plates are coupled with each other according to the preferred embodiment of the present invention.

#### \* Description of symbols of major parts in the drawings \*

30: main unit	31: number keys
33: multimedia key	35: antenna
40: display unit	41: display screen
43: function key	45: camera
47: speaker	50: first plate
51: sliding guide	53: stopper groove

55: first magnet

60: second plate

61: sliding guide

63: stopper spring

65: second magnet

**【DETAILED DESCRIPTION OF THE INVENTION】**

**【PURPOSE OF THE INVENTION】**

**【TECHNICAL FIELD IN WHICH THE INVENTION IS INCLUDED AND  
THE PRIOR ART IN THAT FIELD】**

The present invention relates to a slide type portable terminal, and more particularly, to a slide type portable terminal in which a slide unit and a main unit can be slid against each other.

As an example of a portable terminal, there are a mobile phone, PDA (personal digital assistant), a smart phone, and the like. Such a portable terminal can be classified into bar type, flip type, folder type and the like according to an external configuration thereof. Recently, a slide type portable terminal has come into the market. The configuration of the slide type portable terminal is illustrated in FIGS. 1 and 2.

Referring to these figures, the slide type portable terminal includes a flat, plate-shaped main unit 1 and slide unit 5 that are coupled to be slid in a longitudinal direction. A display screen 2 is provided on a front surface of the main unit 1. A variety of information is displayed on the display screen 2. A speaker 3 is also provided on an upper end of the front surface of the main unit 1 adjacent to the display screen 2. Further, a plurality of function buttons 4 are

provided on a lower end of the front surface of the main unit 1.

The slide unit 5 can be slid against the main unit 1 to protrude beyond the main unit 1 at a predetermined distance and is provided with a plurality of number buttons 6 at a front surface thereof. The number buttons 6 are fully exposed to the outside when the slide unit 2 is slid against and protrudes beyond the main unit 1, whereas they are covered with the main unit 1 when the slide unit 5 and the main unit 1 overlap each other. Further, a microphone 7 is provided on a lower end of the front surface of the slide unit 5.

In particular, FIG. 2 shows a structure for providing the sliding operation of the main unit 1 and slide unit 5 with respect to each other. In such a case, a main plate 10 and a slide plate 15 serve as the sliding structure. The main plate 10 is fixed to the main unit 1 and the slide plate 15 is fixed to the slide unit 5.

Guide channels 11 are formed on both lateral sides of the main plate 10 in a longitudinal direction. Further, fixing holes 12 are bored through lateral ends of the main plate 10. The fixing holes 12 are portions into which an end of a torsion spring 19 to be explained later will be fixed.

The slide plate 15 is relatively shorter than the main plate 10. Further, guide ribs 16 are formed at both lateral ends thereof, respectively, such that the slide plate 15 can be guided and slid along the guide channels 11. Fixing holes 17 are also bored through the slide plate 15.

The main plate 10 and the slide plate 15 are interconnected through the torsion spring 19. That is, an end of the torsion spring 19 is fitted into the fixing hole 11 of the main plate 10 while the other end thereof is fitted into the fixing hole 17 of the slide plate 15. A pair of the torsion springs 19 are provided in a symmetric manner.

According to the prior art so constructed, when the slide unit 5 is slid against the main unit 1, the slide plate 15 is slid along the main plate 10. At this time, the torsion spring 19 provides an elastic force such that the slide unit 5 can be kept in a state where it overlaps the main unit 1 and a state where it fully protrudes beyond the main unit 1 (a state of FIG. 1). In other words, if a user moves the slide unit 5 to a certain position with respect to the main unit 1, the slide unit 5 will be securely moved to a predetermined position by means of the elastic force of the torsion spring 19.

However, the above prior art has the following problems.

First, owing to the elastic force of the torsion spring 19, the slide unit 5 can be kept either in the state where it overlaps the main unit 1 or in the state where it fully protrudes beyond the main unit 1. Therefore, there is a problem in that it is difficult to use the terminal in a variety of states.

In addition, the elastic force of the torsion spring 19 is used to set a stop position of the slide unit 5 against the main unit 1. Therefore, since one end of the torsion spring 19 should be fixed to the main plate 10 and the other end thereof should also be fixed to the slide

plate 15, its assembly works are difficult. Furthermore, since the torsion spring is a mechanically connected structure, there is another problem in that mechanical troubles are likely to occur in use.

**【TECHNICAL TASK WHICH THE PRESENT INVENTION TRIES TO BE OBTAINED】**

Accordingly, the present invention is conceived to solve the aforementioned problems in the prior art. An object of the present invention is to provide a slide type portable terminal that can be used with only necessary function keys exposed to the outside.

Another object of the present invention is to provide a slide type portable terminal of which interlinking mechanism is simplified.

**【CONSTITUTION OF THE INVENTION】**

According to an aspect of the present invention for achieving the objects, there is provided a slide type portable terminal, comprising a main unit including separated first and second key sections that are formed on a surface of the main unit; and a display unit which includes a display screen formed on a front surface of the display unit and is slid along the surface of the main unit to cause the first and second key sections of the main unit to be covered and exposed, first magnet and second magnets provided in the main unit and display unit, and positioned to provide their repulsive force maximally if the first and second magnets are placed on the opposite positions, wherein the display unit can be selectively placed on a position where both the first and second key sections of the main unit are exposed, a position where only one of the key sections is exposed, and a position where both the

first and second key sections are covered.

Preferably, the slide type portable terminal further comprises a stopper mechanism for allowing the display unit to be stopped at the position where only one of the key sections is exposed.

Further, the stopper mechanism may include a stopper groove that is formed on one of the display unit and the main unit, and a stopper spring that is formed on the other one of the units to correspond to the stopper groove and seated selectively into the stopper groove.

Preferably, first and second magnets are arranged on the main unit and the display unit, respectively, so that the same poles of the magnets face each other to provide a repulsive force when they are positioned to face (close to) each other.

More preferably, corresponding sliding structures for performing sliding operations of the main unit and the display unit are provided on opposite lateral ends of the main unit and the display unit.

According to another aspect of the present invention, there is provided a slide type portable terminal, comprising a main unit including separated first and second key sections and a first plate that are formed on a surface of the main unit; a display unit which includes a display screen formed on a front surface of the display unit and a second plate slid with respect to the first plate and is slid along the surface of the main unit to cause the first and second key sections of the main unit to be covered and exposed; and first and second magnets

which are provided on the first and second plates, respectively, so that the same poles of the magnets face each other to provide a repulsive force when they are positioned to face (close to) each other.

Preferably, the slide type portable terminal further comprises a stopper mechanism for allowing the display unit to be stopped at a position where one of the key sections is exposed.

Further, the stopper mechanism may include a stopper groove that is formed on one of the first and second plates, and a stopper spring that is formed on the other one of the plates to correspond to the stopper groove and seated selectively into the stopper groove.

Hereinafter, a preferred embodiment of a slide type portable terminal according to the present invention will be described in detail with reference to the accompanying drawings.

FIG. 3 is a perspective view of the slide type portable terminal according to the preferred embodiment of the present invention, FIG. 4 is an exploded perspective view showing the structure of first and second plates according to the present invention, and FIG. 5 is a rear view showing a state where the first and second plates are coupled with each other according to the present invention.

Referring to these figures, a main unit 30 takes the shape of a generally thin hexahedron and is provided with a plurality of number keys 31 at a front surface thereof. The number keys 31 have a function of inputting numbers, characters and the like. The number keys 31 are arranged in the form of a 4 by 3 matrix.

Multimedia keys 33 are also provided below the number keys 31, i.e. at a lower end of a front surface of the main unit 30. The multimedia keys 33 are used to perform a multimedia function inherent to the terminal. For example, they may be a key for operating a camera 45 to be explained below, a key for playing the MP3, or the like. These multimedia keys 33 are provided in a row at the lower end of the front surface of the main unit 30.

An antenna 35 is provided at one side of an upper end of the main unit 30. The antenna 35 is required for external communications. A microphone 37 is also provided at a lowermost end of the front surface of the main unit 30. The microphone 37 functions as a telephone transmitter when the terminal is used as a telephone.

Further, a display unit 40 is provided on the front surface of the main unit 30. The display unit also takes the shape of a generally thin hexahedron, and a display screen 41 is provided on a front surface of the display unit. As the display screen 41, a liquid crystal panel is commonly used but a liquid crystal panel having a touch screen function may also be used. Of course, other various display units may be used for the display screen 41.

A plurality of function keys 43 are provided at a lower end of the front surface of the display unit 40. The function keys 43 allow the function of the terminal to be immediately performed. For example, the function keys include a key used to execute a program for sending and receiving an electronic mail, a key used to perform a telephone



function when receiving a phone call, a key used to select contents displayed on the display screen 41, and the like.

The camera 45 is also provided at one side on the upper end of the front surface of the display unit 40. The camera 45 is rotatably mounted to the display unit 40 such that a camera angle can be changed without moving the camera itself. Reference numeral 47 designates a speaker and corresponds to a telephone receiver when performing the telephone function.

The main unit 30 and the display unit 40 are slid against each other in a longitudinal direction thereof so that the number keys 31 and the multimedia keys 33 can be exposed or covered. To allow the main unit 30 and the display unit 40 to be slid against each other as described above, a structure for guiding the sliding operation of the main unit 30 and display unit 40 should be provided on the units themselves.

Referring now to FIGS. 4 and 5, an example of the structure, which is installed on the main unit 30 and display unit 40 so as to guide the sliding operation thereof, will be described. First, a first plate 50 is provided on the front surface of the main unit 30, more specifically, at a position above the number keys 31. Sliding guides 51 for allowing the first plate 50 to be slid with respect to a second plate 60 (to be explained later) are provided at both lateral ends of the first plate 50.

Stopper grooves 53 are provided at a longitudinal side of the first plate 50. In the illustrated embodiment of the present invention,

the stopper grooves 53 are formed at both lateral ends of the first plate 50 to face each other. Further, first magnets 55 are provided about in the middle of the first plate 50 in a longitudinal direction thereof. Although the two first magnets 55 have been employed in the illustrated embodiment of the present invention, the present invention is not necessarily limited thereto. Alternatively, the magnets 55 may be installed across the first plate 50.

Next, the second plate 60 is installed on a rear surface of the display unit 40. The second plate 60 is slid with respect to the first plate 50. Sliding guides 61 that correspond to the sliding guides 51 of the first plate 50 are also provided at both lateral ends of the second plate 60. In the illustrated embodiment of the present invention, the sliding guides 51 and 61 are in the forms of guide channels and guide ribs, respectively, but the present invention is not necessarily limited thereto. Alternatively, any other guide structures for allowing the first and second plates 50 and 60 to be slid against each other may be added.

Stopper springs 63 are also provided on the second plate 60 to correspond to the stopper grooves 53 of the first plate 50. As clearly shown in an expanded view in FIG. 4, the stopper springs 63 are formed by causing a middle portion of a metal band to be bent and protrude outwardly. Front ends of the stopper springs 63 protrude outwardly through holes 63' that are formed on both lateral sides of the second plate 60. The outwardly protruding front ends of the stopper springs 63 are securely seated into the stopper grooves 53 so that the sliding

operation made between the first and second plates 50 and 60 is stopped. Rear ends of the stopper springs 63 are held on one side of the second plate 60 such that the springs can provide an elastic force.

Second magnets 65 are also provided on the second plate 60. It is preferred that the second magnets 65 be provided equal in number to the first magnets 55. The first and second magnets 55 and 65 are arranged in such a manner that the same poles of the magnets face each other to provide a repulsive force when they are positioned close to each other. Furthermore, if the first and second magnets 55 and 65 are placed on the opposite positions of the first and second plates 50 and 60, their repulsive force can be maximally provided. However, a larger gap is required between the first and second plates 50 and 60 due to their thickness. To this end, the magnets 55 and 65 may be placed into grooves or holes that are formed on the opposite positions of the plates 50 and 60.

Hereinafter, the operation of the slide type portable terminal according to the present invention so constructed will be described in detail.

The slide type portable terminal of the present invention has two stop positions when the display unit 40 is slid with respect to the main unit 30. That is, when the display unit 40 is slid with respect to the main unit 30, the display unit 40 is first stopped at a position where only the multimedia keys 33 on the main unit 30 are exposed to the outside. Such a state is shown in FIGS. 7a and 7b.

Such a state is obtained because the front end of the stopper spring 63 is securely seated into the relevant stopper groove 53. That is, if a user pushes up the display unit 40 against the front surface of the main unit 30 in a state of FIG. 6, the second plate 60 is slid against the first plate 50 and the stopper spring 63 of the second plate 60 is then securely seated into the stopper groove 53, whereby the sliding operation will be stopped. Therefore, the user can use the multimedia keys 33 in a state shown in FIG. 7a.

Of course, if the user applies a force sufficient to overcome the elastic force of the stopper spring 63 to the display unit 40, the stopper spring 63 is not seated into but passes over the stopper groove 53. Therefore, a state shown in FIG. 8 can be directly obtained.

In the meantime, if a user wishes to use the number keys 31 while using the multimedia keys 33 in the state where the stopper spring 63 is securely seated into the stopper groove 53, the following steps will be performed. That is, if the user applies a predetermined force to the display unit 40, the stopper spring 63 is elastically deformed by the sliding guide 51 and then retracted into the holes 63'. Thus, the display unit 40 can be slid against the main unit 30.

In addition, if the display unit 40 is further slid against the main unit 30, the magnets 55 and 65 are placed on a position where they face each other. In such a position, the magnets 55 and 65 provide a repulsive force. At this time, the display unit 40 will be slid with respect to the main unit 30 by means of the resultant force of the

repulsive force between the magnets 55 and 65 and a pushing force applied by the user, in a direction in which the user applies the pushing force to the display unit 40.

For example, if the user applies a pushing force to the display unit 40 in a direction of an arrow A in a state shown in FIG. 7b, the first plate 50 is slid against the second plate 60 such that the state shown in FIG. 8 can be obtained. In such a state, the number keys 31 are fully exposed so that the user can use the number keys 31. Here, it is apparent that an additional stopper mechanism for allowing the display unit 40 or the second plate 60 to stop against the main unit 30 or the first plate 50 at the state shown in FIG. 8 is required. The additional mechanism may be provided at specific corresponding positions of the units 30 and 40, the plates 50 and 60, or the pair of sliding guides.

On the other hand, the user can allow the display unit 40 and the main unit 30 to overlap each other, i.e. obtain the state shown in FIG. 6a, by merely applying a force to the display unit 40 in a direction of an arrow B shown in FIG. 8b.

Then, the second magnet 65 of the second plate 60 is gradually approached to the first magnet 55 of the first plate 50, and finally, the state where they face each other is obtained. In such a state, if an additional force is applied to the display unit 40 by the user, the display unit 40 is continuously moved by the resultant force of the pushing force applied by the user and the repulsive force between the magnets 55 and 65.

At this time, if the force applied to the display unit 40 is a force sufficient to overcome the elastic force of the stopper spring 63 and thus to pass over the stopper groove 53, it goes directly into the state shown in FIG. 6 without undergoing the state shown in FIG. 7a, i.e. the state where the stopper spring 63 is securely seated into the stopper groove 53.

For reference, the position where the magnets 55 and 65 directly face each other may vary according to the design conditions. For example, it can be designed such that the magnets 55 and 65 directly face each other at an intermediate position between a state (position) where the display unit 40 moves highest and a state (position) where the stopper spring 63 is securely seated into the stopper groove 53. In such a case, the repulsive force between the magnets 55 and 65 is used to allow the display unit 40 to be slid to the two positions.

Alternatively, it can be designed such that the magnets 55 and 65 directly face each other at an intermediate position between a state (position) where the display unit 40 moves highest and a state (position) where the display unit 40 and the main unit 30 overlap each other. In such a case, the repulsive force between the magnets 55 and 65 is used to allow the display unit 40 to be slid into the state where the display unit 40 moves highest and the state where the display unit 40 and the main unit 30 overlap each other (to the two positions). At this time, the elastic force of the stopper spring 63 should be greater than the repulsive force between the magnets 55 and 65.

It should be understood that the present invention is not limited to the preferred embodiment but construed as defined in the appended claims. Accordingly, it is apparent to those skilled in the art that various modifications, additions and substitutions can be made thereto without departing from the scope and spirit of the invention as disclosed in the appended claims.

As clearly stated in the appended claims, for example, the sliding operation of the display unit can be performed in two steps by the stopper mechanism, so that the slide type portable terminal can be used either in a state where only the multimedia keys are exposed or in a state where the number keys as well as the multimedia keys are exposed.

Further, the present invention may be configured in such a manner that the main unit and the display unit are slid against each other without using the first and second plates. The structure or mechanism for performing the sliding operation between the first and second plates can be implemented in various manners other than that illustrated in the accompanying drawings.

#### **【EFFECT OF THE INVENTION】**

As described above, according to the slide type portable terminal of the present invention, the display unit can be slid in two steps when it is slid with respect to the main unit. As a result, the main unit can be exposed in whole or in part, if necessary, so that a desired operation can be performed. Therefore, there is an advantage in that the user

can use the slide type portable terminal in various manners and thus the convenience of user can also be enhanced.

In addition, according to the present invention, the display unit can be slid against the main unit by using the magnetic force of the magnets instead of mechanically interlocking parts. Therefore, there is another advantage in that the production costs and failure rate can be reduced due to decrease in the number of parts of the slide type portable terminal.